KUMARAGURU
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B.E/B.TECH DEGREE EXAMINATIONS: MAY 2017

(Regulation 2014)

Sixth Semester

CIVIL ENGINEERING

U14CET602**:** Design of Masonry and RC Structures

COURSE OUTCOMES

CO1:   Design masonry walls for axial and eccentrically loads

CO2:   Design counterfort and cantilever retaining walls

CO3:   Design underground and overhead water tanks

CO4:   Design slab using Yield line theory

CO5:   Design bridges and flat slab

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1.   Matching list I with List II   CO5 [K_1]

List I	List II
A. Culvert	i.column strip
B. Component of flat slab	ii.earth pressure
C. Retaining wall	iii. minor bridge
D. Collapse load	iv.yield line

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	ii	iv

2.   _____ is defined as a upright member, the width of which exceeds four times its   CO1   [K_1]

thickness.

a)   Column   b)   Wall

c)   Footing   d)   Slab

3. Consider the following statements   CO1 [K₁]

    1. Strength of brick masonry depends on type of mortar used
    2. Brick masonry with lime mortar gains full strength earlier than cement mortar masonry
    3. Mortar strength decides the strength of masonry

Which of the above statement(s) is/ are true

a)	1,3	b)	1only
c)	1,2 and 3	d)	2 only

4. A structure which is used for maintaining the ground surfaces at different elevations on either side is called   CO2 [K₁]

a)	Retaining wall	b)	Deep beam
c)	Flat slab	d)	Footing

5. Assertion (A): The load factor for live load is greater than that for dead load.   CO1 [K₁]

Reason (R): The live loads are more uncertain than dead loads.

a)	Both A and R are Individually true and R is the correct explanation of A	b)	Both A and R are Individually true but R is not the correct explanation of A
c)	A is true but R is false	d)	A is false but R is true

6. As per IS:3370 the minimum grade of concrete used for water tank is   CO3 [K₁]

a)	M 20	b)	M 25
c)	M 30	d)	M 35

7. Minimum clear cover (in mm) to the main steel bars in slab, beam, column and footing respectively are   CO5 [K₂]

a)	10,15,20,25	b)	15,25,40,40
c)	20,25,30,40	d)	20,35,40,75

8. Yield line theory gives _____ solution with respect to collapse load   CO4 [K₁]

a)	Upper bound	b)	Lower bound
c)	Neutral	d)	Unbalanced

9. Assertion (A): For eccentricity ratio exceeding 1/6, effective thickness of masonry will get reduced   CO1 [K₁]

Reason (R): For eccentricity ratio exceeding 1/6, there will be tension on one side of the member

a)	Both A and R are Individually true and R is the correct explanation of A	b)	Both A and R are Individually true but R is not the correct explanation of A
c)	A is true but R is false	d)	A is false but R is true

10. The minimum thickness of flat slab shall be   CO5 [K$_1$]

     a) 300 mm   b) 250 mm

     c) 200 mm   d) 125 mm

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. What is meant by eccentrically loaded brick wall?   CO1 [K$_1$]

12. Define effective height of wall.   CO1 [K$_2$]

13. What are the different modes of failure of a retaining wall?   CO2 [K$_2$]

14. What is counterfort retaining wall?   CO2 [K$_1$]

15. Write down the formula for calculating Hoop tension in circular water tank.   CO3 [K$_2$]

16. Differentiate circular and rectangular over head water tank.   CO3 [K$_2$]

17. List two methods in designing the slab by Yield line theory.   CO4 [K$_1$]

18. Draw any four yield line patterns in R.C. Slab.   CO4 [K$_2$]

19. Classify the bridges based on loading condition.   CO5 [K$_1$]

20. What is meant by Drop of flat slab?   CO5 [K$_2$]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Explain in detail about classification of masonry wall.   CO1 [K$_2$]

22. A Hall measures 3m x 5m. The roof slab of the hall is supported by brick wall all round. The total UDL from the slab is 7 kN/m2. Design the solid wall of 5m long. The head room is 3m. Assume compressive strength of brick as 5 N/mm2 and 1:5 cement mortar.   CO1 [K$_6$]

23. Design a T- Shaped cantilever retaining wall to retain earth embankment 3 m high above ground level. The unit weight of earth is 18 kN/m^3 and its angle of repose is 30^0. The embankment is horizontal at its top. The safe bearing capacity of soil may be taken as 100 kN/m^2 and the coefficient of friction between soil and concrete as 0.5. Grade of concrete used M 20 And Steel Fe 415.   CO2 [K$_6$]

24. Design a circular water tank of capacity 400 m^3 resting on the ground and having a fixed base condition due to a rigid joint between the wall and the base slab. The materials to be used are M 25 grade concrete and HYSD steel of grade Fe 415. Use the method recommended in IS: 3370 (Part IV).

CO3   [K$_6$]

25. A square slab of side length 4 m is simply supported at the ends and carries a service load of 3 kN/ m^2. Design the slab. Use M 20 concrete and Fe 415 steel. Assume suitable data.

CO4   [K$_6$]

26. Design a reinforced concrete slab culvert for a National Highway crossing with the following data.

Carriage way Two lane (7.5 m wide)

Foot paths – 1 m on either side

Clear span - 6 m

Wearing coat – 80 mm

Width of bearing - 400 mm

Grade of concrete used M 20

Grade of Steel used Fe 415 HYSD

Loading IRC Class A tracked vehicle.

Design the reinforced concrete slab deck. Design with the specifications of IRC: 6-2000 and IRC: 21-2000 codes.

CO5   [K$_6$]

27. Enumerate the characteristics of Yield line.

CO4   [K$_2$]

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